REMARKS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-5, 8, 10, and 12-14 are presently active, Claims 1, 2, and 10 having been amended and Claims 6, 7, 9 and 11 having been canceled without prejudice by the present amendment. No new matter has been added.[1]

In the outstanding Office Action, Claims 1-3, 8, and 11 were rejected under 35 U.S.C. §103(b) as being unpatentable over Ushikoshi et al (U.S. Pat. No. 5,306,895) in view of Hecht et al (U.S. Pat. No. 5,877,475). Claim 4 was rejected under 35 U.S.C. §103(a) as being unpatentable over Ushikoshi et al in view of Hecht et al and Arena et al (U.S. Pat. No. 5,635,093). Claim 5 was rejected under 35 U.S.C. §103(a) as being unpatentable over Ushikoshi et al in view of Hecht et al and Yoshida et al (U.S. Pat. No. 6,080,970).

Firstly, Applicants acknowledge with appreciation the courtesy of Supervisory Patent Examiner Walberg to discuss this case on May 30, 2003 during which the outstanding issues in the final Office Action were discussed. No agreement on patentability was reached.

Amended Claim 1 defines a ceramic heater including a sintered ceramic plate having a heating element formed inside the sintered ceramic plate and a bottomed hole made, being directed from an opposite side to a heating surface for heating an object to be heated, toward the heating surface. A bottom portion of the bottomed hole is formed relatively ***nearer to*** the heating surface ***than the heating element***, and a temperature-measuring element is included in the bottomed hole and pressed on the bottom portion of the bottomed hole.

[1] New Claim 12 is supported in the specification on page 8, lines 32-34; New Claim 13 is supported in the specification on page 17, lines 9-14, and on page 20, lines 27-28; New Claim 14 is supported in the specification on page 12, lines 1-3.

As such, a temperature measurement carried out at the bottomed hole position and nearer to the heating surface than to the heating element is only slightly affected by the temperature changes/variations of the heating element. Further, the temperature-measuring element is not affected by the atmosphere. Hence, a temperature of the heating surface can be precisely measured in the ceramic heater of Claim 1.[2]

For example, a temperature of the heating surface is controlled by increasing and decreasing the temperature of the heating element. In the ceramic heater shown on attached Fig. A, when the temperature of the heating element changes, the temperature-measuring element immediately detects the temperature change in the heating element, and cannot measure the temperature of the heating surface itself. In the ceramic heater shown on attached Fig. B, the temperature measurement is only slightly affected by the temperature change of the heating element, and precisely measures the temperature of the heating surface. In the ceramic heater shown on attached Fig. C, the temperature-measuring element is not included in the bottomed hole. In this case, the temperature-measuring element cannot measure the temperature of the heating surface precisely since it contacts the opposite surface of the heating surface and also since the temperature measurement of the temperature-measuring element is affected by the atmosphere.

Meanwhile, a precise temperature measurement can be carried out by including a temperature-measuring element in a bottom portion of a bottomed hole of a ceramic substrate, the bottomed hole being relatively ***nearer to the heating surface than the heating element,*** as defined in Claim 1.

Since the ceramic heater of Claim 1 includes a sintered ceramic plate, the surface of the bottom portion of the bottomed hole has irregularities due to the existence of pores or crystal grains. Applicants submit that a precise temperature measurement is not possible if a

[2] Specification, page 6, lines 7-11.

temperature-measuring element (e.g., a thermocouple) merely contacts the irregular surface of the bottom portion of the bottomed hole in the sintered ceramic heater plate. As defined in Claim 1, the temperature-measuring element is pressed on the bottom portion of the bottomed hole. As such, a precise temperature measurement can be realized since no space is formed between the temperature-measuring element and the irregular bottom surface. Hence, the two recited features of "a bottom portion of said bottomed hole formed relatively nearer to the heating surface than the heating element" and "a temperature-measuring element included in said bottomed hole and pressed on the bottom portion of said bottomed hole" permit the ceramic heater of Claim 1 to overcome the difficulties in accurately measuring the temperature of a sintered ceramic plate.

If the bottom portion of the bottomed hole is formed relatively nearer to the heating element than the heating surface, the temperature-measuring element detects the temperature change of the heating element, and cannot measure the temperature of the heating surface itself. If the temperature-measuring element is not pressed on the bottom portion of the bottomed hole, a precise temperature measurement is not realized due to the irregular surface of the bottomed hole. If the temperature-measuring element is not included in the bottomed hole, the temperature measurement is affected by the atmosphere.

Applicants submit that such features and effects are not found in the applied prior art.

Ushikoshi et al disclose a ceramic healer including a resistive-heating element embedded in a ceramic substrate.[3] Ushikoshi et al show for example in Figure 1 that a thermocouple 10 is inserted in a ceramic substrate 4. There is no disclosure in Ushikoshi et al regarding the positioning of the thermocouple in a bottomed hole which is formed relatively ***nearer to the heating surface than the heating element***. Only Figures 1, 2, 24, 27, and 28 provide subject matter in Ushikoshi et al pertinent to the positioning of the bottomed hole.

M.P.E.P. § 2125 states that proportions of features in a drawing are not evidence of actual proportions when drawings are not to scale. In Figures 1, 28, and 39 of Ushikoshi et al, the thermocouples are shown approximately at the level of heat-generating resistive body 5. In Figure 2 of Ushikoshi et al, the bottom of the insertion hole is depicted farther from the heat-generating surface 3 than from the heating resistive body 5. In none of the ceramic heaters depicted in Ushikoshi et al is it shown or suggested that the thermocouple is pressed on a bottomed hole which is formed relatively ***nearer to the heating surface than the heating element***, as defined in Claim 1. Indeed, the ceramic heaters in Ushikoshi et al correspond at best to the ceramic heater arrangement shown in attached Fig. A. The thermocouples in Ushikoshi et al, being approximately at the level of heat-generating resistive body 5, are not formed nearer to the heating surface than the heating element. Thus, the thermocouples in Ushikoshi et al are more sensitive to temperature changes in the heating element (i.e., the heat-generating resistive body 5) than to the ceramic substrate itself, and thus cannot measure the temperature of the heat-generating surface precisely. Furthermore, Applicants submit that it is also not clear from the drawings or disclosure in Figures 1, 28, and 39 of Ushikoshi et al that the thermocouple sheath is in contact with a bottom of the ceramic heater hole as there appears a cross-hatched depiction in these figures which could very well represent a spaced region between the thermocouple sheath and the wall of the ceramic heater. Even if the thermocouple contacts a bottom of the insertion hole in Ushikoshi et al, the thermocouples in Ushikoshi et al are not pressed on the bottom of the bottomed hole and the bottom portion of the bottomed hole is not formed closer to the heating surface than the heating elements, as defined in Claim 1.

Accordingly, it is respectfully submitted that the ceramic heater defined in Claim 1 is not anticipated by or made obvious in view of Ushikoshi et al.

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[3] Ushikoshi et al, column 6, lines 37-46.

The deficiencies of Ushikoshi et al are not overcome by combining Hecht et al with Ushikoshi et al. Hecht et al disclose a radiant heating body 1 including a glass ceramic plate 3, not a sintered ceramic plate. Glass is produced by melting, and does not have pores and surface irregularities. Therefore, the glass ceramic plate of Hecht et al does not have a problem that a space is formed between a temperature measuring element and an irregular surface. Accordingly, one cannot predict from Hecht et al that a precise temperature measurement is avoided by pressing a temperature-measuring element on the bottom portion of a bottomed hole of a sintered ceramic heater plate.

As shown in Figure 5 of Hecht et al, the temperature sensor 12 extends from a backside until the temperature sensor comes into contact against an underside of the glass ceramic plate 3.[4] Contrary to that reported in the Office Action, the temperature sensor does not contact the heating surface of the ceramic substrate, but rather the temperature sensor contacts a surface opposite to the heating surface. In such an arrangement like that shown in attached Figure C, Applicants submit that a precise temperature measurement of the heating surface is not possible. As such, there is no disclosure or suggestion in Hecht et al for a temperature sensor in contact with a bottom portion of a bottomed hole formed relatively nearer to the heating surface than the heating element, as defined in Claim 1. Accordingly, temperature measurements in Hecht et al are affected by the atmosphere around the glass ceramic plate 3. Accordingly, the radiant heating body according to Hecht et al differs from the ceramic heater defined in Claim 1, and the teachings of Hecht et al do not overcome the deficiencies in the teachings of Ushikoshi et al.

The teachings in the secondary art references of Arena et al and Yoshida et al have been considered but are deemed no more pertinent to the question of patentability than the teachings in Hecht et al.

M.P.E.P. § 2143 requires for prima facie obviousness the prior art reference (or references when combined) must teach or suggest all the claim limitations. None of the cited references fail to teach or suggest the ceramic heater defined in Claim 1 to have a temperature sensor in contact with a bottom portion of a bottomed hole formed relatively nearer to the heating surface ***than the heating element***. Moreover, the effects and advantages of the present invention cannot be predicted from these references. Only by impermissible assignment of proportions could the figures of Ushikoshi et al be construed to disclose a bottom portion of a bottomed hole formed relatively nearer to the heating surface than a heating element, as defined in Claim 1.

Therefore, it is respectfully submitted that the present invention is not anticipated by or made obvious in view of the applied art references.

Hence, Claim 1 and Claims 2-5, 8, 10, and 12-14 which depend from Claim 1 patentably define over the applied prior art.

[4] Hecht et. al, column 4, lines 15-17.

Consequently, in view of the present amendment and in light of the above discussions, the outstanding grounds for rejection are believed to have been overcome. The application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully Submitted,

OBLON, SPIVAK, McCLELLAND,
MAIER, & NEUSTADT, P.C.

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Tel.: (703) 413-3000
Fax: (703) 413-2220

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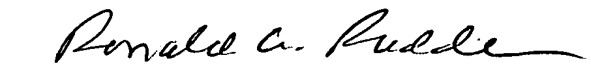

Gregory J. Maier
Attorney of Record
Registration No.: 25,599
Ronald A. Rudder
Registration No. 45,618